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ABSTRACT

As part of a longitudinal study of 710 children, the role of the home physical environment in the school achievement of third grade children is investigated. Home interviews gathered information on family characteristics and physical accommodations. Children's achievement data was obtained by achievement tests and teacher ratings. It was hypothesized that achievement would vary directly with better quality of housing and provision of suitable study space, and that it would vary inversely with measures of crowding and noise. Two-way analysis of variance tables were computed, with physical and social factors (sharing of homework room, housing type, amount of noise, etc.) as independent variables, and achievement data as dependent variables. The hypothesis proved true, with the exception of one physical variable, overcrowding of persons per room of the dwelling unit. Conclusions are tentative due to certain limitations of the study. It may be that, within reasonable limits, it is not the number of people who occupy a dwelling that influences study and retention, but rather the way the available space is divided and used. (NH)

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The Physical Environment as a Mediating Factor in School Achievement*

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This paper is about the role of the home physical environment in school achievement. Few would argue on logical grounds that such physical variables as study space, noise, and crowding in the home are irrelevant to cognitive processes that eventually result in school performance.

Yet, there is a seemingly endless supply of variables that contribute to the performance of the student. Some will argue that school staffing, curriculum, and facilities make the big difference. To improve pupil achievement, investments should maximize these resources. Others point to social factors outside the school as crucial. Such factors as parental characteristics and attidues, sibling position, mobility, and cultural milieu are held to be all important, particularly for those of less than average intelligence. Indeed a recent commentator claimed that, "...we no longer need any further attempts to demonstrate that the general environmental conditions associated with differences in social class influence children's general educational progress."[1]

There is no need to deny the importance of any factor or set of factors in order to pursue the relevance of still another. As a sociologist, for example,

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For discussion, Annual Meeting of the Canadian Sociology and Anthropology Association, June 6-7, 1968, Calgary, Alberta, Session 10 - Family, Schools, and Behaviour.

I feel no compulsion to reject the extremely great influence of socio-economic status as a preliminary gesture to investigating physical aspects of the home environment. Indeed, the major question is what influence these latter variables have on achievement given the traditionally influential factors. Such a question is in order inasmuch as the "best" variables nonetheless explain only a relatively small portion of student differences in achievement. To what extent, then, does the physical environment act as a mediating factor in school achievement?

ON ENVIRONMENT[2]

Housing reformers have long held "that if we could only get our problem families out of those dreadful slums, then papa would stop taking dope, mama would stop chasing around, and junior would stop carrying a knife."[3] Presumably junior would also do better in school, because he would possibly gain more and better space for private contemplation--like many children from more fortunate families.

Yet there are some stern reasons for not accepting these assumptions as proven. First, the overwhelming majority of studies which have linked the home environment with school achievement have dealt with the social environment of the home. By environment, they mean the constellation of sociological and psychological variables found in the child's home, not the physical ecology of his residence. While valid, these pursuits say little about physical variables as forces of their own.[4]

Second, treatment of physical environment often proceeds as if it were unrelated to socio-economic variables when in fact they are highly correlated. Housing is frequently used as an index of status.[5] One author, for example, cites a dysfunctional home environment as noisy and disorganized.[6] It is a common notion now that children who learn to tune out unwanted noises at home will tune out the teacher at school. But yet noise may be but a concomitant of a larger milieu rooted in socio-economic variables which would produce the same effect in school regardless of the noise.

Some other aspects of the home environment which have been treated equally uncritically are housing quality[7] and crowding. This last factor, crowding, has been investigated in several locations. In Scotland, Fraser found that "...of two children of equal intelligence from the same size of family the one coming from the less crowded home would tend to do better in his school work."[8] Yet, we do not know whether crowding is really a factor with independent effects in this case or whether it is a spurious variable. Similarly, Holland, although qualifying his remarks, found in Atlanta high schools that the percent of over-crowded housing in census tracts "is a better predictor of school achievement (i.e. test scores) than family income or any other status variable."[9] In addition, a survey of almost 13,000 high school students in Texas indicated that;

> "Youth who were least hopeful about the future and were distrustful of their fellow man came from houses where the ratio of space per person was the least. That family tension was highest among this same group was not unexpected..."[10]

Thus, when studies of the home environment and school performance do consider the physical environment, they typically leave unstated the extent that these factors are compounded with the more basic variables of social science.

Nonetheless, a few studies pierce through this cloud of uncertainty to suggest that the physical environment may indeed make a difference in performance within categories of social variables. Douglas, for example, reported that tests scores of 8 year old British students varied by housing quality within each social class.[11] Another study, in Berkeley, California, found that school achievement varied by housing quality, holding the occupation of the students' fathers constant.[12]

One of the more rigorous housing studies, that by Wilner and his associates,[13] also sheds light on this question. They compared the lives and health of Negro families moving from deteriorated housing to newly constructed public housing with those of a control group on a longitudinal basis. Expecting to find improvements in school performance from added space and resulting gains in privacy, as the previous public housing literature suggested, Wilner instead traced an improvement in yearly promotions in grade--one of the few differences to stem from the housing change--to the shortened duration of children's illnesses and a subsequently better attendance record. In this case, with status and skin color held constant, housing quality had an effect on school performance, but through still another mediating variable, health.

In short, there is some, but not substantial evidence to support the hypothesis that students' school achievement varies systematically with several features of the home physical environment, given particular socio-economic

characteristics. Specifically, achievement should vary directly with measures of housing quality and the provision of suitable study space. It should vary inversely with measures of crowding and noise. We should expect on this basis higher achievement the more that housing lowers the number of people with whom a student comes in contact, lending an aura of calm and serenity.

To this point, school performance has been treated as a single entity. Yet, it is recognized that it has various components, not all of which are necessarily equally related to the physical environment. Language performance, for example, may not be as related as mathematical compution to space for quiet deskwork.[14] Nonetheless, with no a priori rationale to differentiate among component elements of achievement in this context, I shall apply the additional expectation that the above hypotheses are valid regardless of the specific measure of achievement pursued.

THE PRESENT ANALYSIS

The City of Toronto School Board Research Department has been carrying out a longitudinal study of the achievement of the cohort of students who entered kindergarden in 1962-63. As part of this study home interviews were held in 1966-67 with the mother, if present, or father (or parent surrogate) of children in a sample chosen to reflect equal and matching numbers of students who (1) attended junior kindergarden in 1961-62 and (2) could have attended junior kindergarden but did not do so. The home interviews gathered a great amount of information on family characteristics, attitudes, and physical accommodations.

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In addition, the study had previously gathered achievement data on these children by at least two methods. One was a rating by their teachers on such attributes as creativity, performance, adjustment, and future success. The second type of achievement datum consisted of the results of standardized achievement tests in such areas as spelling, language, and arithmetic.

Therefore, the above-mentioned hypotheses could be tested on 710 Grade 3 students[15] for which there was sufficient data through analysis of the following sets of variables:

1. Achievement Variables

a. Teacher rating - adjustment
b. Teacher rating - performance
c. Teacher rating - creativity
d. Teacher's prediction of future success
e. Metropolitan Achievement Test - spelling
f. Metropolitan Achievement Test - language
g. Metropolitan Achievement Test - arithmetic computation
h. Metropolitan Achievement Test - arithmetic problem solving.

2. Physical Environment Variables

a. Room in which a child spends the most time
b. Sharing of home work place
c. Concurrent uses of home work room
d. Number of persons per room of dwelling
e. Number of families living in same block
f. Noise level inside dwelling
g. Noise level outside dwelling
h. Housing type
i. Housing quality (Warner Scale)

3. Social Environment Variables

a. Mother's education
b. Father's education
c. Mother's occupation
d. Father's occupation
e. income level
f. Whether parents save for child's education
g. Perceived social class
h. Number of moves since 1962
i. Whether father lives at home
j. Number of siblings
k. Language(s) spoken at home.

Each of the social environment variables is a traditionally high discriminator of achievement.

The objective of the data analysis was to assess the amount of effect of the elements of physical environment on school achievement within categories of the social environment variables. Hence, a series of two-way analysis of variance tables were computed, each containing one physical and one social variable as independent variables and with the average achievement score per cross-classificatory cell as the dependent variable. This permitted assessment of whether the elements of the physical environment "created" a significant amount of variation (by standard statistical yardsticks) in students' achievement scores on top of the variation contributed as expected by the social variables.

One table was computed for each combination of physical, social, and achievement variable, as signified by the captions and stubs in Tables 1-8. The general form of each individual table is illustrated by Table 9. All the tables do not contribute to the analysis, however, since the interaction between the social and physical variables led to empty cells in a number of tables. There were not, for example, any college educated mothers living in housing deemed poor.

More tables could have been created by collapsing categories further, but the resulting categories would have become devoid of meaning.

Nonetheless, a large number of tables had full cells and provide data on the hypotheses. The specific results are summarized in the cells of Tables 1 - 8.

RESULTS

First, every physical variable but one accounted for a significant amount of the variation in students' achievement scores in confrontation with at least one social factor. The direction of the effect was as hypothesized in the overwhelming majority of cases. Let us look at these effects one by one.

The room where the student spends most time was a strong factor with respect to most types of achievement. The category "other bedroom" accounted for the highest scores, probably indicating that families set aside a bedroom for study with apparent success. Time spent in one's own bedroom is associated with the second highest scores. Both indicate that these relatively successful students have a place where they can get away from either other people or possibly discordant activities. Children who spend the greatest amount of time in the kitchen are uniformly the lowest scorers. Such a relationship involving kitchens is not just a reflection of the cultural biases of immigrant children, as might be thought, since its relation to language(s) spoken at home is weak and inconsistent.

Sharing of the homework room was an extremely weak factor. Although significantly related in one instance to arithmetic computation, it gave no further evidence of strength. It does not seem to matter except in one type of performance

whether one or several students work in the same room. In that case, however, those with personal privacy of their rooms did better than those who shared.

What does seem to matter about the homework room is that it be devoted, at the time homework is pursued, to quiet, nondisruptive activities. Those who worked in such rooms were judged better by their teachers than were those who frequented rooms where other activities took place concurrently. Functional privacy, there, is more crucial then personal privacy in this context.

Housing type is a factor of only moderate strength, with its primary focus of importance on arithmetic achievement. Although the hypothesized relationship between scores of children living in single family homes, townhouses, walkup apartments, and elevator apartments (i.e. descending level of scores the higher the occupancy of the building) was generally upheld, the children with the very highest scores in arithmetic were those living above stores. Could the influence of family business (particularly those in which the entire family participates) by chance extend into the third grade classroom? Perhaps significant is the fact that the high scorers among those in such accommodations are predominantly those speaking a language other than English at home -- presumably children of immigrants.

Housing quality added significant amounts of variation in achievement beyond that attributable to social factors in every area but creativity and predictions of future success. The hypothesized pattern again stood up.[16]

The noise factors, inside and outside noise, were significant in the pattern hypothesized, but only with respect to creativity, spelling, and language. I

shall return to this point shortly.

Finally, the number of families on the student's face-to-face residential block (i.e. both sides of the street onto which his front door opens) is relevant as hypothesized to several, varied areas of achievement. But its pattern is not one of a uniform correlation. There is relatively little difference among achievement ratings according to this factor until the number of families on the block rises over 100. Only then do achievement ratings lower appreciably.

The one physical factor which does not appear from these data as significant to student achievement is residential overcrowding (i.e. persons per room of dwelling unit). This is a finding of some surprise to which I shall return.

The two last findings are, however, consistent with recent research on pathological effects of residential density. Schmitt, for example, found that net residential density (i.e. persons per acre) was a far more acute discriminat of a miscellany of pathologies than was overcrowding (i.e. persons per room of dwelling).[17]

It is a bit difficult to make any strong conclusions about whether physical home environment affects school performance equally well in all aspects due to the limitation on number of cases brought about by empty cells. Yet, as

Table 10 summarizes, the only drastic difference between teacher ratings and the Metropolitan Achievement Tests, in their reflection of physical factors, lies in the area of housing quality. Housing quality accounts for variation in test scores more frequently than in teacher ratings.

It is worth noting with respect to specific types of achievement that "creativity" is related to fewer physical variables than any of the other areas. However, one of the two physical variables adding significantly to this type of achievement (although to few others) is inside noise. One can only speculate on the extent of importance of quiet to the development of one's own ideas.

A final item worth discussing stems from the relative insignificance of internal crowding and sharing of homework rooms at the same time that the room where a child spends most time and concurrent uses of the homework room appear strong. It would appear that it is not the number of people (within reasonable limits) who occupy a study room or dwelling of a certain size that influences subsequent study or retention but rather the way these people divide up the available space and use it. Large numbers do not always mean that people are in each others' hair, provided that they have some leeway in arranging for the grouping of compatible activities and the separation of incompatible ones.[18]

This finding is consistent with Biderman's review of historical incidents of extreme overcrowding. Biderman concluded that the same degree of crowding can have drastically different results - literally life or death - depending on the degree of hope and internal social organization of the group involved. On this very basis, great numbers of residents of Hong Kong live in relative social equanimity in densities four times higher than the highest densities found in North America.[19] They <u>separate their functions</u> so that incompatible activities do not take place inside the dwelling unit.

In sum, selected aspects of the home physical environment that cross-cut the

social factors which influence education play a part in the performance of school children. This is not at all to say that optimum physical factors add uniformly to achievement regardless of a student's other characteristics, but rather that they are an important part of home environment with elements above and beyond their status connotations. Moreover, rational allocation and use of space, so as to provide functional though not necessarily personal privacy, is a commodity that can be seen and taught - more so than many attitudes which influence school performance. Although physical arrangements often follow attitudes and life styles of people, it is not inconceivable that they could become to some extent functionally autonomous of them if communicated to parents together with traditional counselling materials.

Nonetheless, despite previous qualifications and the obvious tentativeness of the results, several additional sources of caution must be stressed. First, the validity of the achievement scores was taken at face value. The score on the Metropolitan Achievement Test for arithmetic computation was taken to be an accurate measure of that attribute and not, say, IQ. In addition, interviewer ratings of attributes such as noise inside home are taken at face value despite being subject to interviewer bias. Finally, one must remember that the student ratings and scores are for Grade 3. The skills, habits, and cognitive development relevant to third graders undoubtedly differs from those of other levels of education, and so may be the factors that influence them. These points of caution, however, set guidelines for additional research activity.

FOOTNOTES

[1]C. Burt, review of J.W.B. Douglas, "Home and the School: A study of Ability and Attainment in the Primary Schools", British Journal of Educational Psychology, Vol. 35(1965):259-64.

[2]A term paper, "An Investigation of Some Aspects of Housing and Homework", by a student in my graduate urban sociology seminar, Mr. Ronald Faris, was very helpful in writing this section.

[3]Daniel Seligman, "The Enduring Slums", In William H. Whyte, Jr. (ed), The Exploding Metropolis, Garden City, N.Y.: Doubleday and Co., 1957, p. 106.

[4]Lloyd Warner et al, Social Class in America, Gloucester, Mass.: Peter Smith, 1957.

[5]See, for example, J.K. Tuel and R. Wursten, "Dimensions of the Educational Environment", California Journal of Educational Research, Vol. 16 (1965): 177-88, D.F. Swift, "Family Environment and 11+ Success: Some Basic Predictors", British Journal of Educational Psychology, Vol. 37 (1967): 10-21, W.D. Sheldon and L. Carillo, "The Relation of Parents, Home and Certain Developmental Characteristics to Children's Reading Ability', Elementary School Journal, Vol. 52 (1952): 262-70, and Richard E. Schutz, "A Factor Analysis of Academic Achievement and Community Characteristics", Educational and Psychological Measurement, Vol. 20 (1960): 513-18.

[6]E.W. Gordon, "Characteristics of Socially Disadvantaged Children's Home Environment and Family Status", Review of Educational Research, Vol. 35 (1965): 377-79.

[7]See, for example, H.T. Filmer and H.S. Kahn, "Race, Socio-Economic Level, Housing, and Reading Readiness", Reading Teacher, Vol. 21 (1967): 153-57, and S.L. Chopra, "A Comparative Study of Achieving and Underachieving Students of High Intellectual Ability", Exceptional Child, Vol. 33 (1967): 631-34.

[8]E. Fraser, Home Environment and the School , London: University of London Press, 1959, p. 55. See also Oliver C. Moles, Jr., "Training Children in Low-Income Families for School", Welfare in Review, Vol. 6 (June, 1965): 1-11.

[9]J. W. Holland, "A Study of Internal and External Determinants of Outputs of an Urban Secondary School System", unpublished doctoral dissertation, Syracuse University, 1967, p. 247.

[10]B.M. Moore and W.H. Holtzman, Tomorrow's Parents - A Study of Youth and Their Families, Austin: University of Texas Press, 1965, p. 273.

[11]J.W.B. Douglas, The Home and the School, London: McGibbon & Kee, 1964, p. 38.

[12]T.A. Chandler, "Reading Disability and Socio-Economic Status", Journal of Reading, Vol. 10 (Oct., 1966): 5-21.

[13]Daniel M. Wilner et al, The Housing Environment and Family Life, Baltimore: Johns Hopkins Press, 1962.

[14]See, for example, A.F. Perrodin and W.T. Snipes, "The Relationship of Mobility to Achievement in Reading, Arithmetic, and Language in Selected Georgia Elementary schools", Journal of Educational Research, Vol. 59 (1966): 315-319.

[15]i.e. achievement measures are for Grade 3. Data on both social and physical environment stems from Grade 4. There is naturally a loss of accuracy stemming from taking data from two points in time. Nonetheless, this should not have a substantial biasing effect in any single direction on the analysis.

[16]It was not possible to investigate Wilner's findings on the role of health as a mediating variable in this paper, but such an endeavor is forthcoming.

[17]Robert C. Schmitt, "Density, Health, and Social Organization", Journal of the American Institute of Planners, Vol. 32 (1966): 38-40.

[18]Albert Biderman et al, Historical Incidents of Extreme Overcrowding, Washington, D.C.: Bureau of Social Science Research, Inc., 1963.

[19]Robert C. Schmitt, "Implications of Density in Hong Kong", Journal of the American Institute of Planners, Vol. 29 (1963): 210-17.

TABLE 1. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social Environment Factors as Independent Variables and ADJUSTMENT TEACHER RATINGS as the Dependent Variable.

	Physical Environment Factors								
Social Environment Factors	Place child spends most time 1	Sharing of Home-work Room 2	Concomitant Uses of Home - work Room 3	Density 4	Housing Type 5	Housing Quality 6	Noise Inside 7	Noise Outside 8	Number of Families on Block 9
Mother's Education 1	-	NS	-	-	-	-	-	-	-
Father's Education 2	-	NS	-	-	-	-	-	NS	-
Mother's Occupation 3	-	NS	-	-	-	-	-	NS	-
Father's Occupation 4	-	NS	-	-	-	-	-	-	-
Income level 5	-	NS	-	-	-	-	-	-	-
Whether parents save for childs education 6	NS	NS	.01*	NS	NS	.05	NS	NS	NS*
Percieved Social Class 7	-	NS	-	-	-	-	-	NS	.05*
Moves in past six years 8	-	NS	-	NS	-	NS	NS	NS	NS
Whether father lives at home 9	-	NS	.05	-	NS	.05	NS	NS	NS
Number of Siblings 10	NS	NS	-	-	-	NS	-	-	NS
Language(s) Spoken at Home 11	-	NS	-	-	-	-	-	NS	NS

Key: .05 = physical factor significant at .05 level or better
.01 = physical factor significant at .01 level or better
.001= physical factor significant at.001 level or better
NS = physical factor not significant at .05 level
* = social factor significant at .05 level or better
- = incomplete table

TABLE 2. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social Environment Factors as Independent Variables and PERFORMANCE TEACHER RATINGS as the Dependent Variable.

	Physical Environment Factors								
Social Environment Factors	Place child spends most time 1	Sharing of Homework Room 2	Concomitant Uses of Homework Room 3	Density 4	Housing Type 5	Housing Quality 6	Noise Inside 7	Noise outside 8	Number of Families on Block 9
Mother's Education 1	-	NS	-	-	-	-	-	-	-
Father's Education 2	-	NS	-	-	-	-	-	NS	-
Mother's Occupation3	-	NS	-	-	-	-	-	NS*	-
Father's Occupation4	-	NS	-	-	--	-	-	-	-
Income level 5	-	NS	-	-	-	-	--	-	-
Whether Parents Save for Child's Education 6	.01	NS	.05*	NS	NS	.01	NS	NS	NS*
Perceived Social Class 7	-	NS	-	-	-	-	-	NS	NS*
Moves in Past Six Years 8	-	NS	-	NS	-	NS	NS	NS	NS
Whether atherives at ome 9	-	NS	NS	-	NS	NS	NS	NS	NS
Number of Siblings10	.01	NS	-	-	-	NS	-	-	NS
Language(s) Spoken at Home 11	-	NS	-	-	-	-	-	NS	NS

Key: .05 = physical factor significant at .05 level or better
.01 = physical factor significant at .01 level or better
.001= physical factor significant at.001 level or better
NS = physical factor not significant at .05 level.
* = social factor significant at 0.5 level or better
- = incomplete table

TABLE 3. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social environment Factors as Independent Variables and CREATIVITY TEACHER RATINGS as the Dependent Variable.

	Physical Environment Factors								
Social Environment Factors	Place Child Spends Most time 1	Sharing of Home-work Room 2	Concom-itant Uses of Home-work Room 3	Density 4	Housing Type 5	Housing Quality 6	Noise Inside 7	Noise Outside 8	Number of Fam-ilies on Block 9
Mother's Educat-ion 1	-	NS	-	-	-	-	-	-	-
Father's education 2	-	NS	-	-	-	-	-	NS	-
Mother's occupat-ion 3	-	NS	-	-	-	-	-	NS	-
Father's Occupat-ion 4	-	NS	-	-	-	-	-	-	-
Income level 5	-	NS	-	-	-	-	-	-	-
Whether parents Save for Child's Education 6	NS	NS	.05*	NS	NS	NS	NS	NS	NS
Perceived Social Class 7	-	NS	-	-	-	-	-	NS	NS
Moves in Past Six Years 8	-	NS	-	NS	-	NS*	.01*	NS	NS
Whether father lives at home 9	-	NS	.05*	-	NS	.01	NS	NS	NS
Number of Siblings 10	NS	NS	-	-	-	NS	-	-	NS
Language(s) spoken at Home 11	-	NS	-	-	-	-	-	NS	NS

Key: .05 = physical factor significant at .05 level or better
.01 = physical factor significant at .01 level or better
.001 = physical factor significant at .001 level or better
NS = physical factor not significant at .05 level
* = social factor significant at .05 level or better
- = incomplete

TABLE 4. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social Environment Factors as Independent Variables and TEACHERS PREDICTIONS OF FUTURE SUCCESS as the Dependent Variable.

	Physical Environment Factors								
Social Environment Factors	Place Child Spends Most Time 1	Sharing of Home Work Room 2	Concomitant Uses of Homework Room 3	Density 4	Housing Type 5	Housing Quality 6	Noise Inside 7	Noise Outside 8	Number of Families on Block 9
Mother's Education 1	-	NS	-	-	-	-	-	-	-
Father's Education 2	-	NS	-	-	-	-	-	NS*	-
Mother's Occupation 3	-	NS*	-	-	-	-	-	NS	-
Father's Occupation 4	-	NS	-	-	-	-	-	-	-
Income level 5	-	NS*	-	-	-	-	-	-	-
Whether Parents Save for Child's Education 6	-	NS	.05	-	.05	NS*	NS*	NS*	NS*
Perceived Social Class 7	-	NS	-	-	-	-	-	NS*	.05*
Moves in Past Six Years 8	-	NS	-	-	-	NS	NS	NS	NS
Whether Father Lives at Home 9	-	NS	.01*	-	NS	NS	NS	NS	NS
Number of Siblings 10	.001*	NS	-	-	-	NNS	-	-	.05*
Language(s) Spoken at Home 11	-	NS	-	-	-	-	-	NS	NS

Key: .05 + physical factor significant at .05 level or better
.01 + physical factor significant at .01 level or better
.001+pphysical factor significant at.001 level or better
NS + physical factor not significant at .05 level.
* + social factor significant at .05 level or better
- + incomplete table

TABLE 5. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social Environment Factors as Independent Variables and SPELLING ACHIEVEMENT as the Dependent Variable.

	Physical Environment Factors								
Social Environment Factors	Place Child Spends Most Time	Sharing of Home-work Room	Concomit-ant Uses of Homework Room	Density	Housing Type	Housing Quality	Noise Inside	Noise Outside	Number of Famil-ies on Block
	1	2	3	4	5	6	7	8	9
Mother's Educat-ion 1	-	NS	-	-	-	-	-	-	-
Father's Educat-ion 2	-	NS	-	-	-	-	-	NS	-
Mother's Occupat-ion 3	-	NS	-	-	-	-	-	NS	-
Father's Occupat-ion 4	-	NS	-	-	-	-	-	-	-
Income Level 5	-	NS	-	-	-	-	-	-	-
Whether Parents Save for Child's Education 6	.01*	NS	-	NS	NS*	NS	NS	NS	NS
Perceived Social Class 7	-	NS	-	-	-	-	-	NS	NS
Moves in Past Six Years 8	-	NS	-	NS	-	.05*	NS	NS	-
Whether Father Lives at Home 9	-	NS	-	-	NS	-	.01*	NS	NS*
Number of Siblings 10	.05	NS	-	-	-	NS	-	-	NS
Language(s) Spoken at Home 11	-	NS	-	NS	-	-	NS	NS	NS

Key: .05 = physical factor significant at .05 level or better
.01 = physical factor significant at .01 level or better
.001 = physical factor significant at .001 level or better
NS = physical factor not significant at .05 level
* = social factor significant at .05 level or better
- = incomplete table

TABLE 6. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social Environment Fectors as Independent Variables and LANGUAGE ACHIEVEMENT as the Dependent Variable.

	Physical Environment Factors								
Social Environment Factors	Place Child Spends Most Time 1	Sharing of Home-work Room 2	Concomit-ant Uses of Home-work Room 3	Density 4	Housing Type 5	Housing Quality 6	Noise Inside 7	Noise Outside 8	Number of Families on Block 9
Mother's Educat-ion 1	-	NS	-	-	-	-	-	-	-
Father's Educat-ion 2	-	NS*	-	-	-	-	-	NS	-
Mother's Occupat-ion 3	-	NS	-	-	-	-	-	NS	-
Father's Occupat-ion 4	-	NS*	-	-	-	-	-	-	-
Income Level 5	-	NS*	-	-	-	-	-	-	-
Whether Parents Save for Child's 6 Education	.05*	NS	-	NS*	NS	.001*	NS	NS	NS*
Perceived Social Class 7	-	NS	-	-	-	-	-	.05*	.05*
Moves in Past Six Years 8	-	NS	-	NS*	-	NS	NS	NS	-
Whether Father Lives at Home 9	-	NS	-	-	NS	-	.05	NS	NS
Number of Siblings 10	.01*	NS	-	-	-	.001	-	-	NS
Language(s) Spoken at Home 11	-	NS	-	NS	-	-	NS	.05	.05

Key: .05 = physical factor significant at .05 level or better
.01 = physical factor significant at .01 level or better
.001 = physical factor significant at .001 level or better
NS = physical factor not significant at .05 level
* = social factor significant at .05 level or better
- = incomplete table

TABLE 7. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social Environment Factors as Independent Variables and ARITHMETIC COMPUTATION as the Dependent Variable.

Social Environment Factors	Physical Environment Factors: Place Child Spends Most time 1	Sharing of Home-work Room 2	Concom-itant Uses of Home-work Room 3	Density 4	Housing Type 5	Housing Quality 6	Noise Inside 7	Noise Outside 8	Number of Fam-ilies on Block 9
Mother's Education 1	-	NS	-	-	-	-	-	-	-
Father's Education 2	-	NS	-	-	-	-	-	NS	-
Mother's Occupation 3	-	-	-	-	-	-	-	-	-
Father's Occupation 4	-	NS	-	-	-	-	-	-	-
Income Level 5	-	NS	-	-	-	-	-	-	-
Whether Parents Save for Child's Education 6	NS*	NS	-	NS	.05*	.05	NS*	NS*	NS*
Perceived Social Class 7	-	NS	-	-	-	-	-	NS*	NS
Moves in Past Six Years 8	-	.05*	-	NS*	-	.05	NS	NS	-
Whether Father lives at Home 9	-	NS	-	-	NS	-	NS	NS	NS
Number of Siblings 10	NS	NS	-	-	-	.01	-	-	NS
Language(s) Spoken at Home 11	-	NS	-	NS	-	-	NS	NS	NS

Key:
.05 = physical factor significant at .05 level or better
.01 = physical factor significant at .01 level or better
.001 = physical factor significant at.001 level or better
NS = physical factor not significant at .05 level
* = social factor significant at .05 level or better
\- = incomplete table

TABLE 8. -- Summary of Results of Analysis of Variance Tables with Selected Physical and Social Environment Factors as Independent Variables and ARITHMETIC PROBLEM SOLVING as the Dependent Variable.

	Physical Environment Factors								
Social Environment Factors	Place Child Spends Most time	Sharing of Home-work Room	Concomitant Uses of Home-work room	Density	Housing Type	Housing Quality	Noise Inside	Noise Outside	Number of Families on Block
	1	2	3	4	5	6	7	8	9
Mother's Education 1	-	NS	-	-	-	-	-	-	-
Father's Education 2	-	NS*	-	-	-	-	-	NS	-
Mother's Occupation 3	-	-	-	-	-	-	-	-	-
Father's Occupation 4	-	NS	-	-	-	-	-	-	-
Income level 5	-	NS	-	-	-	-	-	-	-
Whether Parents Save for Child's Education 6	.05*	NS	-	NS*	.05*	.001*	NS*	NS*	NS*
Perceived Social Class 7	-	NS	-	-	-	-	-	.05*	NS*
Moves in Past Six Years 8	-	NS	-	NS	-	NS*	NS	NS	-
Whether Father lives at Home 9	-	NS	-	-	NS	-	NS	NS	NS
Number of Siblings 10	.05	NS	-	-	-	.001	NS	.05*	NS
Language(s) Spoken at Home 11	-	NS	-	NS	-	-	NS	NS	NS

Key: .05 = physical factor significant at .05 level or better
.01 = physical factor significant at .01 level or better
.001 = physical factor significant at.001 level or better
NS = physical factor not significant at .05 level
* = social factor significant at .05 level or better
- = incomplete table

TABLE 9.-- Analysis of Variance for Independent Variables "Mobility" and "Noise Inside Home" and Dependent Variable "Creativity Teacher Rating."

	Noise Inside Home		
Moves in Last 6 Years	High	Medium	Low
3 or fewer	10.85	11.61	13.17
4 or more	10.00	10.44	12.00

$F(\text{Noise}) = 142.32 > F_{2,2}(.01) = 99.01$

$F(\text{Mobility}) = 96.73 > F_{1,2}(.05) = 18.51$

TABLE 10. -- Summary of Significant Relations of Individual Physical Factors and Achievement Measures (in%)

Achievement Measures	Physical Environment Factors								
	Place Child Spends Most Time	Sharing of Homework Room	Concomitant Uses of Homework Room	Density	Housing Type	Housing Quality	Noise Inside	Noise Outside	Number of Families on Block
Teacher Ratings:									
Adjustment	0%(n=2)	0%(11)	100%(2)	0%(2)	0%(2)	50%(4)	0%(3)	0%(7)	17%(6)
Performance	100(2)	0 (11)	50 (2)	0 (2)	0 (2)	25 (4)	0 (3)	0 (7)	0 (6)
Creativity	0(2)	0 (11)	100 (2)	0 (2)	0 (2)	25 (4)	33 (3)	0 (7)	0 (6)
Prediction	100(1)	0 (11)	100 (2)	-	50 (2)	0 (4)	0 (3)	0 (7)	33 (6)
Total Teacher Ratings	43%(7)	0%(44)	88%(8)	0%(6)	13%(8)	25%(16)	8%(12)	0%(28)	13%(24)
Metropolitan Achievement tests:									
Spelling	100%(2)	0%(10)	-	0%(3)	0%(2)	33%(3)	25%(4)	0%(7)	0%(5)
Language	100 (2)	0 (10)	-	0 (4)	0 (2)	67 (3)	25 (4)	29 (7)	40 (5)
Arithmetic Computation	0 (2)	10 (10)	-	0 (3)	50 (2)	100 (3)	0 (4)	0 (5)	0 (5)
Arithmetic Problem Solving	100 (2)	0 (10)	0 (1)	0 (3)	50 (2)	67 (3)	0 (5)	33 (6)	0 (5)
Total Metropolitan Achievement Tests	75% (8)	3%(40)	0%(1)	0%(13)	25%(8)	67%(12)	12%(17)	16%(25)	10%(20)
TOTAL: ALL MEASURES	60%(15)	1%(84)	78%(9)	0%(19)	19%(16)	42%(28)	10%(29)	8%(53)	11%(44)